Claims:

1. An interferometer including:

a beam displacing assembly arranged to split an input beam into separated first and second basis beams and to combine said basis beams to produce at least one output beam; and

a phase analyser responsive to the at least one output beam and arranged to determine a difference in phase shift imparted to one of said basis beams relative to the other by a test piece.

2. An interferometer according to claim 1, wherein the beam displacing assembly includes first and second polarising beam displacers.

3. An interferometer according to claim 2, wherein the second polarising beam displacer is orientated inversely relative to the first polarising beam displacer.

4. An interferometer according to claim 2, wherein a half-wave plate is located between the first and second polarising beam displacers.

5. An interferometer according to claim 1 wherein the phase analyser comprises a polarimetric phase retrieval assembly arranged to calculate the phase shift on the basis of signals representing Stokes parameters associated with the output beam.

6. An interferometer according to claim 1, wherein the beam displacing assembly is arranged to impart horizontal and vertical polarizations to the first and second basis beams.

7. An interferometer according to claim 6, wherein the phase analyser comprises a polarimetric phase retrieval assembly including half-wave and quarter wave plates to transform left and right circular components of the at least one output beam into corresponding vertical and horizontal components.

8. An interferometer according to claim 7, including means to discriminate between the vertical and horizontal components.

9. An interferometer according to claim 8, including photodetectors to produce electrical signals corresponding to the vertical and horizontal components.

10. An interferometer according to claim 9, including means to combine the electrical signals to produce signals corresponding to Stokes parameters.

11. An interferometer according to claim 10, including a processor responsive to the signals corresponding to the Stokes parameters and arranged to generate a signal indicating a phase shift imparted to one of the basis beams relative to the other.

12. An interferometer according to claim 1, wherein the beam displacing assembly includes a beam splitter arranged to split the input beam into the separated first and second basis beams

13. An interferometer according to claim 12, including first and second holographic plates arranged to impart respectively orthogonal spatial modes to said first and second basis beams.

14. An interferometer according to claim 13, including a means to superpose the first and second basis beams thereby creating said at least one output beam.

15. An interferometer according to claim 14, wherein the means to superpose the first and second basis beams comprises a beamsplitter.

16. An interferometer according to claim 14, wherein the means to superpose the first and second basis beams comprises a holographic plate.

17. An interferometer according to claim 14, wherein the means to superpose the first and second basis beams produces first and second output beams comprising a superposition of transverse spatial modes.

18. An interferometer according to claim 17, wherein the phase analyser includes a number of spatial mode analysers each including a means to convert a desired one of said transverse spatial modes to a lowest order spatial mode.

19. An interferometer according to claim 18, wherein the means to convert one of said transverse spatial modes to a lowest order spatial mode comprises a holographic plate.

20. An interferometer according to claim 19, including a spatial mode filter arranged to filter light from the holographic plate.

21. An interferometer according to claim 20, wherein the spatial mode filter comprises a single mode optical fibre.

22. An interferometer according to claim 21, wherein light from said optical fibre is converted to a corresponding electrical signal by means of a photodetector.

23. An interferometer according to claim 22, including a means to combine corresponding electrical signals from each of the number of spatial mode analysers in order to obtain signals representing Stokes parameters.

24. An interferometer according to claim 23, including a processor arranged to process the signals representing Stokes parameters in order to generate a signal corresponding to a phase shift imparted to one of said basis beams relative to the other.

25. An interferometer including:

means for splitting an input beam into a first pair of basis beams;

means for recombining said first pair of basis beams to form at least one output beam; and

means for processing the at least one output beam to determine a relative phase shift imparted between the said first pair of basis beams.

26. An interferometer according to claim 25, wherein the means for splitting the input beam is arranged so that the first pair of basis beams comprises respective orthogonally polarized beams.

27. An interferometer according to claim 26, wherein the means for splitting the input beam is arranged so that the first pair of basis beams comprises respective horizontally and vertically polarized beams.

28. An interferometer according to claim 26, wherein the means for splitting the input beam is arranged so that the first pair of basis beams comprises respective orthogonal spatial mode beams.

29. An interferometer according to claim 27, wherein the means for processing the at least one output beam comprises a polarimetric phase retrieval assembly.

30. An interferometer according to claim 29, wherein the polarimetric phase retrieval assembly is arranged to calculate the phase shift from signals representing Stokes parameters.

31. An interferometer according to claim 28, wherein the means for processing the at least one output beam includes a number of spatial mode filters.